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(54) Upright freezer with selective frost accumulation.

(57) An upright freezer comprising a number of evaporator sections (8A, 8B, 8C, 8D) connected in series, each section associated with a shelf (3A, 3B, 3C, 3D) of the freezer compartment (2). In order to accumulate frost deposits at a predetermined point the freezer comprises a further evaporator section (8E) with separate throttle means (18) in series with the other sections and accommodated at the top of the compartment. Said further evaporation section (8E) being associated with electrical resistance elements (10, 14) and drip tray (12) for defrosted deposits.

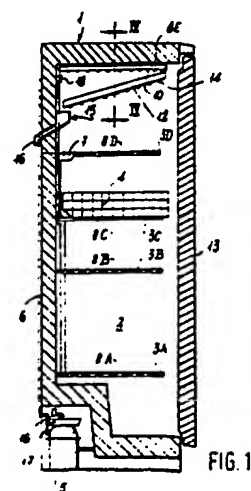


FIG. 1

## Upright freezer with selective frost accumulation.

This invention relates to an upright freezer comprising an insulated housing defining a preservation compartment closed by an insulated door and containing a series of shelves, a refrigeration circuit formed from a compressor, a condenser bank, a throttling member and an evaporator formed from various section in series, each associated with or forming part of one of the shelves.

Upright freezers of this type are known. The drawback from which they suffer derives from the frost deposits which form to a greater or lesser extent on the various shelves, which not only necessitates lengthy defrosting which cannot be entrusted to defrosting resistance elements, but also substantially reduces the heat coefficient.

The object of the present invention is to obviate these drawbacks by facilitating the defrosting operating and effectively opposing frost formation on the evaporator sections, this being done by providing selective frost accumulation at a predetermined point of the preservation compartment.

In an upright freezer of the aforesaid type, this object is attained according to the invention by providing in the top of the preservation compartment a further evaporator section disposed in series with the others and connected to these latter by way of a further throttling member.

This further section, disposed in the "hottest" part of the preservation compartment, thus assumes a temperature lower than the other sections, so that the moisture is removed in the form of frost on this section without affecting the others.

The invention will be more apparent from the detailed description given hereinafter by way of example with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic vertical section through an upright freezer;

Figure 2 is a diagrammatic, partly spatial view of the refrigeration circuit of the upright freezer;

Figure 3 is a diagrammatic illustration of a possible shelf construction;

Figure 4 is a diagrammatic section on the line IV-IV of the Figure 1.

Figure 5 is a diagrammatic vertical section through an upright freezer;

Figure 6 is a diagrammatic section on the line II-II of Figure 5;

and

Figure 7 is a perspective view, partly sectioned for greater clarity, of an evaporator section of Figure 4.

In the figures, the reference numeral 1 indicates the insulated housing or cabinet of an up-

right freezer. This defines a preservation compartment 2 closed by an insulated door 13. Fixed shelves 3A, B, C etc are situated at various levels in this compartment, and on which the foodstuffs to be preserved or frozen are supported either directly or in extractable baskets 4. The upright freezer comprises a refrigeration circuit formed from a compressor 5, a condenser bank 6 disposed on the rear of the housing 1, throttling member 7 (consisting for example of a conventional capillary) and an evaporator bank comprising various sections 8A, 8B, 8C, 8D, 8E connected in series, each of which being associated with one of the shelves 3A, 3B, 3C... as shown in Figure 3, in which the shelf is formed from a conventional refrigerated grid 9.

Alternatively, the shelf can be formed from a plate clinched to the aluminium tube of the coil.

According to the invention there is provided in the top of the cabinet a further evaporator upper section 8E, 8F which is connected to the other sections by way of a further throttling member 18 (for example consisting of a conventional capillary), so that this section when in operation assumes a lower temperature than the other sections.

The circulation through the refrigeration circuit is indicated by the arrows in Figure 2.

Experimental tests carried out by the applicant on an upright freezer constructed in accordance with the teachings of the present invention have shown that the frost is substantially formed on the sections 8E, 8F. The frost accumulation on the other evaporator sections was only minor.

To defrost the section 8E, 8F respectively, a defrosting electrical resistance element 10 is provided in contact with the evaporator section. During defrosting water and ice pieces which separate from this section fall into a drip tray 12, 13 resp. underneath the evaporator section. The drip tray is provided with another electrical resistance element 14 of lesser power than element 10, the purpose of which being to melt the ice pieces which fall into the drip tray. The drip tray conveys the water to a collector 15 fixed to the rear wall of the compartment 2 and connected to a discharge pipe 16 which emerges from the housing and terminates above evaporation tray 17 disposed on the compressor 5, the heat of which is used for evaporating this water.

In Fig. 4 an embodiment of a drip tray 12 is illustrated. The drip tray is connected in such a way that the air can freely move from and towards section 8E. In this respect, the drip tray comprises two rows of inclined channels 12A disposed at different heights and offset from each other, the

channels of the lower row having a width L which is greater than the distance D between two channels of the upper row. The air moves in the direction shown by the arrows of Figure 4.

In the embodiment according to Figures 5-7 the further evaporator section 8F is U-shaped. The three legs of the U extend along the inner walls of the preservation compartment and are connected to the walls by means of known spacers (not shown). The section 8F may comprise a flat pipe coil 10, between the branches of which there extend pieces 11 to act as fins. Said section is disposed above a drip channel 13 of similar shape fixed in any known manner to the inner walls of the compartment 2. The drip channel 13 has a sloping base in order to convey the water resulting from defrosting towards a pipe 16. The pipe 16 terminates above an evaporation tray 17 disposed on the compressor 5, the heat of which is used for evaporating this water. Alternatively, a tray 19 placed above a portion 6A of the condenser bank 6 can be provided for collecting the water resulting from defrosting. The tray 19 can either be present alone or can supplement the evaporation tray 17, in which case either it can be connected in the usual manner to this latter or the two trays can receive the condensation water from two different pipes.

The arrangement of the further evaporator section 8F with drip tray 13 along the walls of the inner compartment results in a larger available space for storing food than in the embodiment of Figure 4.

## Claims

1. A upright freezer comprising an insulated housing (1) defining at least one preservation compartment (2) closed by an insulated door (13) and containing a series of shelves (3A, 3B etc), a refrigeration circuit formed from a compressor (5), a condenser bank (6), a throttling member (7) and an evaporator formed from various sections (8A, 8B, 8C....) in series, each associated with or forming part of one of the shelves, characterized by providing in the top of the preservation compartment (2) a further evaporator section (8E, 8F) disposed in series with the others and connected downstream to these by way of a further throttling member (18).

2. An upright freezer as claimed in Claim 1, characterized in that said further evaporator section (8E) is provided with at least one defrosting resistance element (10) and with a drip tray (12, 13) with discharge means (16, 17, 19) for defrost water.

3. An upright freezer as claimed in Claim 2, characterized in that said drip tray (12) comprises offset channels (12A) which allow air to pass from and towards said section (8E).

4. An upright freezer as claimed in Claim 2, characterized in that said further evaporator section (8F) is substantially U-shaped, the three legs of which are disposed along the inner walls of the preservation compartment (2) and extend substantially parallel to these, said further evaporator section being arranged above a drip channel (13) having a similar U-shape.

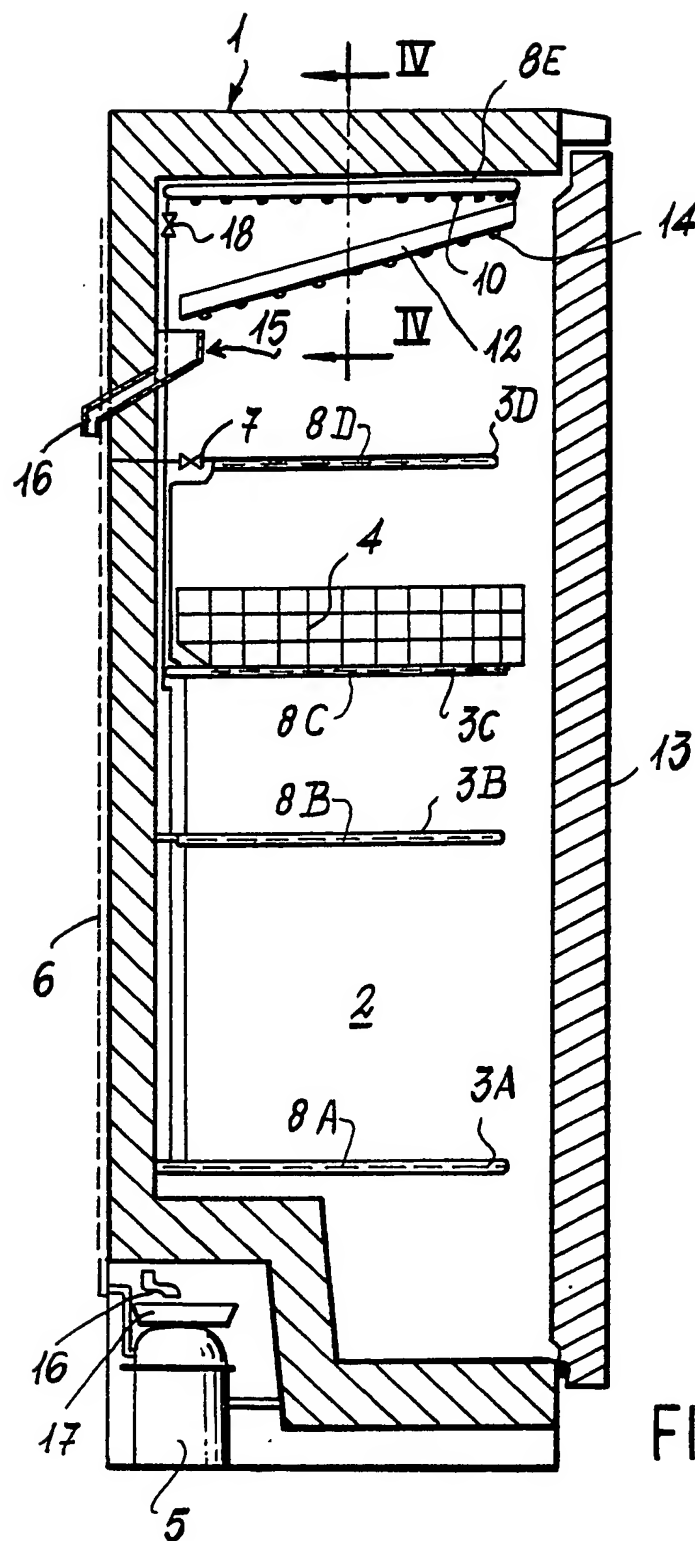


FIG. 1

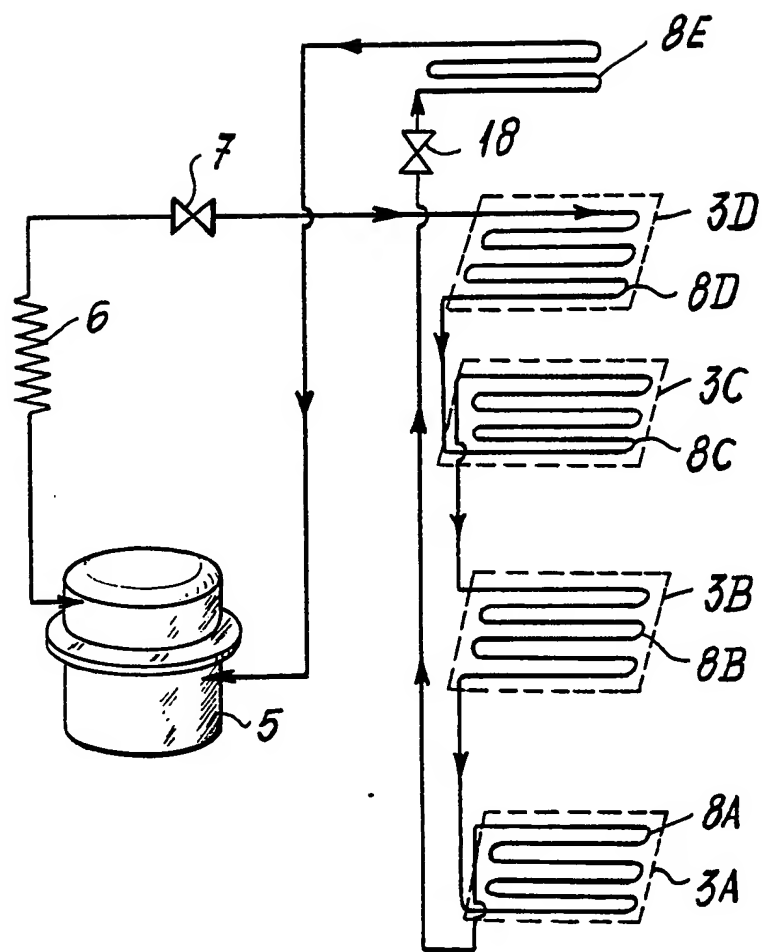


FIG. 2

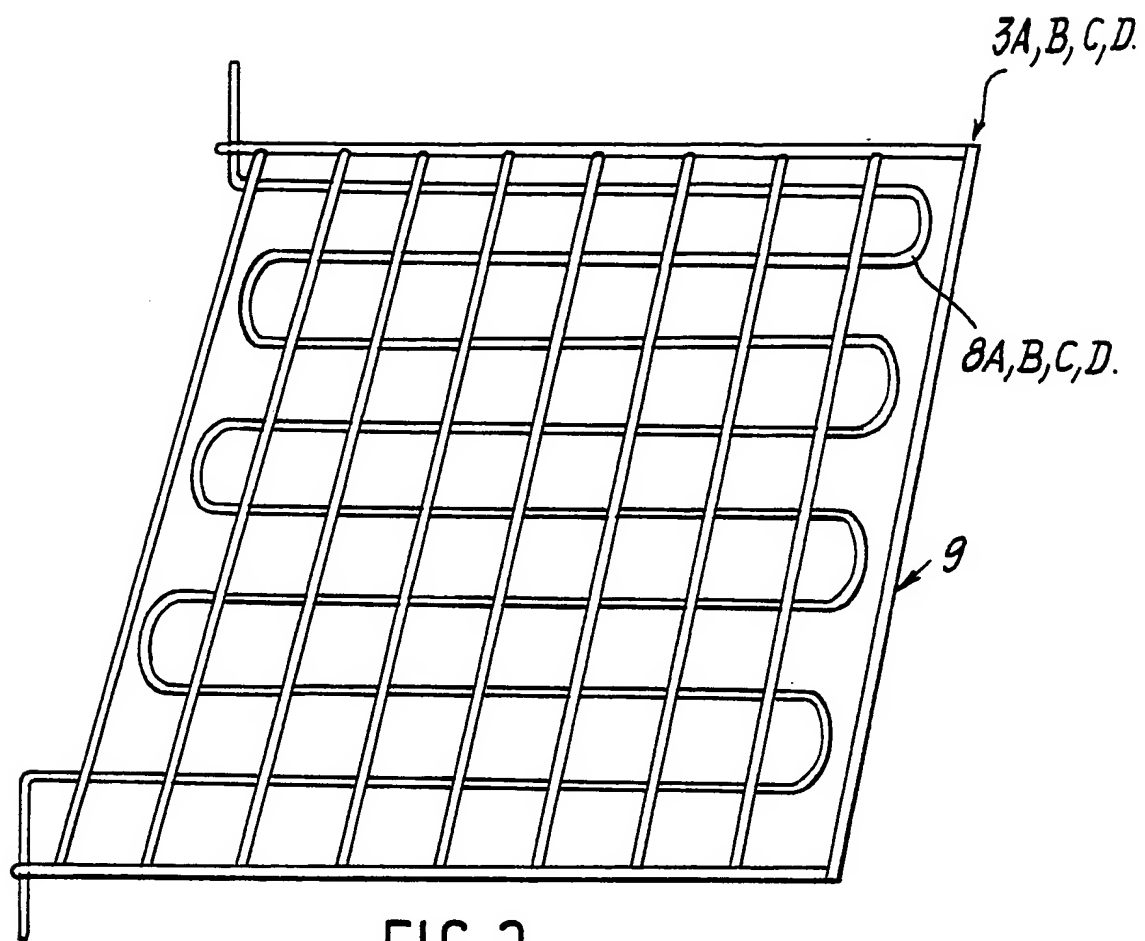


FIG. 3

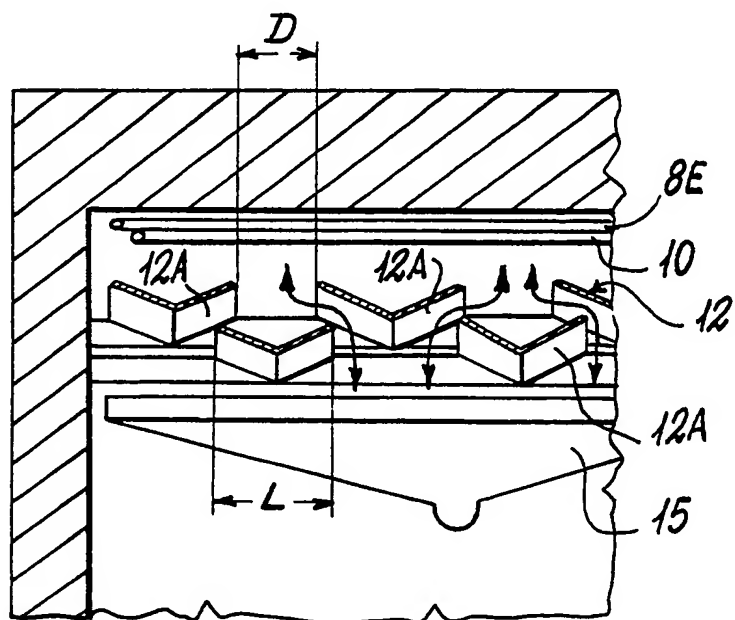


FIG. 4

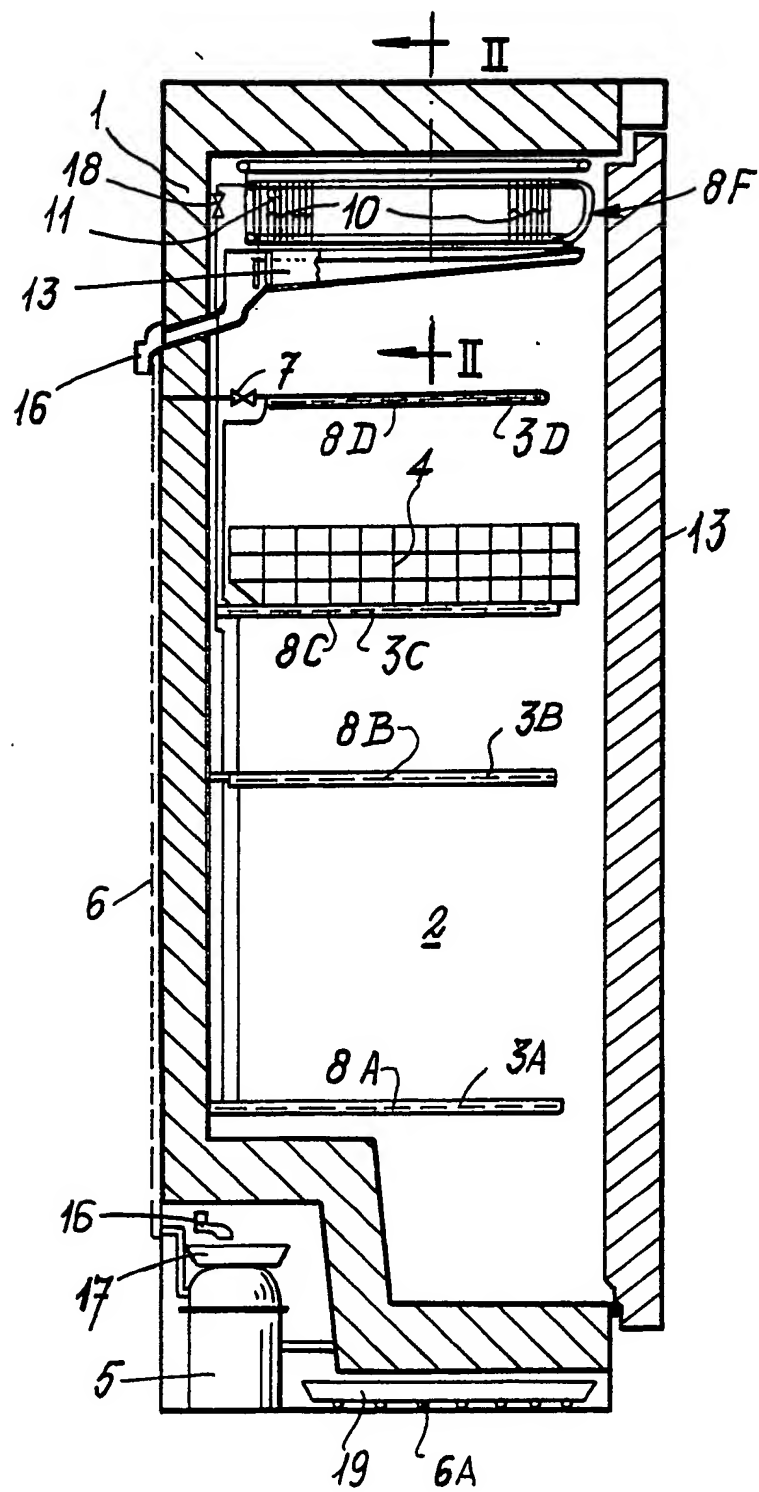


FIG. 5

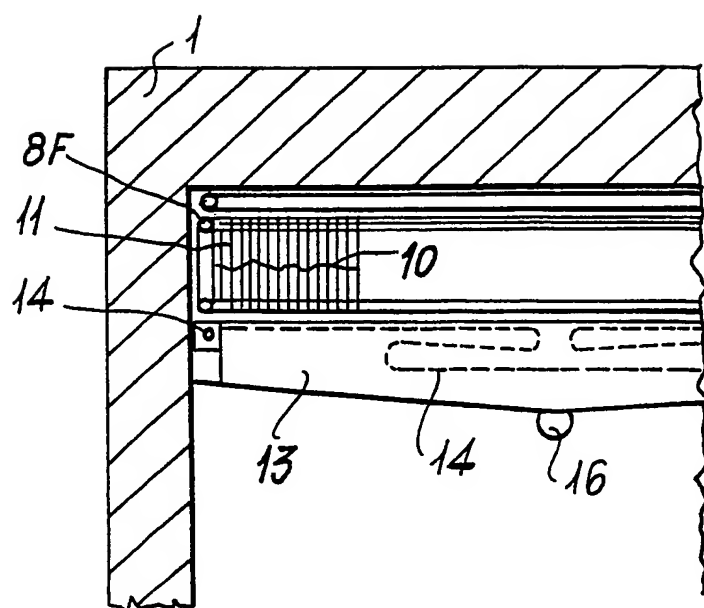


FIG. 6

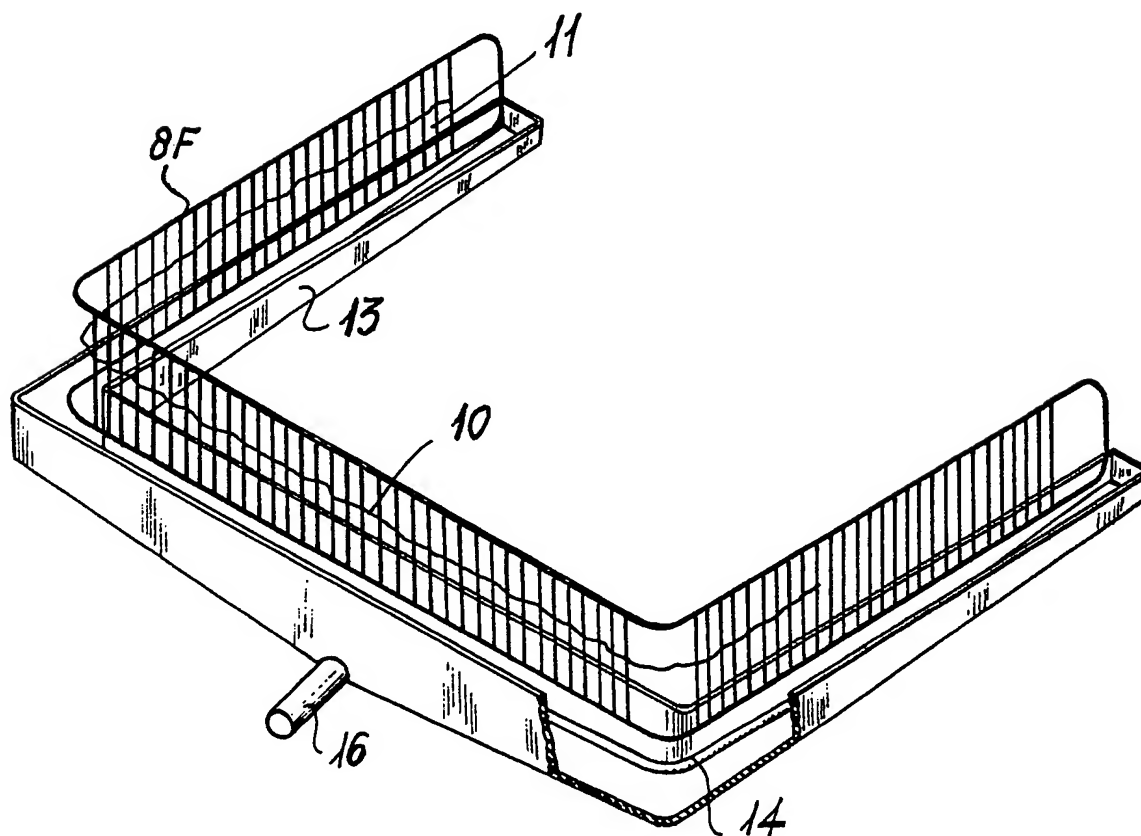


FIG. 7